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Supplemental Lysine in Feed or Water for Early Weaned Pigs

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Previous work at this and other experiment stations has shown that many practical swine rations may be deficient in the amino acid lysine. This is particularly true of rations that may be somewhat low in protein for the younger pig since protein or amino acid requirements are higher during the early growth period. Last year it was reported here (A.S. Series 67-27) that pigs weaned at three weeks of age and fed rations minimal in protein content gained faster and more efficiently when lysine was added to the water or feed. The experiment reported herein was an attempt to confirm the previous results and also to study the effect of lysine on certain blood constituents.

Experimental Procedure

Twenty-four five week old pigs averaging about 20 pounds in weight were allotted into three groups of eight pigs each on the basis of litter, weight and sex. Each group was then randomly assigned to one of the three treatments which were:

Group 1 - Basal ration
Group 2 - Basal plus 0.3% supplemental lysine in feed
Group 3 - Basal plus lysine in water (equivalent to 0.3% in feed)

The pigs in this trial were kept in individual pens and feed and water was available ad libitum. Protein levels were adjusted throughout the experiment with levels calculated to be two percent suboptimum at all stages. The composition of the basal rations is shown in table 1.

Blood samples were collected at 0, 42 and 78 days after initiation of the trial. Analyses were made for hematocrit, red blood cell count, total serum protein, serum globulin and serum albumin.

Results

The results of this experiment are shown in table 2. Average daily gain and feed efficiency data are given for each of the three periods as well as for the average performance for the entire experiment.

During the first four weeks of this trial when the 16% protein ration was fed, pigs receiving supplemental lysine either in the feed or water gained approximately 0.2 pound per day faster than the control pigs and required from 10 to 15% less feed per pound of gain.

The control pigs were lighter in weight at 9 weeks of age when the rations were reduced to 14% protein. This fact along with their slower rate of gain resulted in a much longer period of time for them to reach a weight of approximately 75 pounds. Pigs receiving lysine gained significantly faster and more efficiently during this period. Average daily gains were 0.90, 1.43 and 1.42 pounds for the control, lysine in feed and lysine in water, respectively. The lysine supplemented pigs required about 20% less feed per unit of gain during this period.

The trends observed in average daily gains and feed efficiency during the third period were similar to those of the first two periods with lysine supplementation again resulting in increased gains and improved feed efficiency. For the entire 78 day trial, lysine supplementation gave significant improvement in daily gains and feed efficiency. Pigs fed the control ration gained 0.83 pound per day compared to 1.21 and 1.28 pounds for those receiving lysine in the feed or water. Pounds of feed required per pound of gain were 2.96, 2.63 and 2.58 for pigs fed the control or lysine in feed or water, respectively. There did not appear to be any difference in the method of supplementation as pigs receiving the supplemental lysine in the feed or in the water performed similarly.

Of the various blood components studied only serum albumin indicated a difference because of lysine supplementation. This blood protein constituent increased due to lysine supplementation. Total serum protein, serum globulin, hematocrit and red blood cell counts all increased with increasing age of pigs but did not differ due to lysine supplementation.

Summary

Early weaned pigs weighing 20 pounds were fed 16% protein rations from 5 to 9 weeks of age, 14% protein rations from 9 weeks to 75 pounds and 12% protein rations from 75 pounds to approximately 115 pounds. These rations contained 0.67, 0.54 and 0.41% lysine, respectively. Supplementation of 0.3% lysine to the feed or to the water (equivalent to 0.3% in feed) resulted in increased gains and feed efficiency indicating that the basal rations were deficient in lysine content for pigs of this size.

Serum albumin was higher in the blood of pigs receiving supplemental lysine, but total serum protein, serum globulin, hematocrit or red blood cell count were not affected by lysine content of the ration.

Table 1. Composition of Rations, Percent

Feeding period	5 to 9 wks. of age	9 weeks to 75 lbs.	75 to 115 lbs.
Crude protein	16%	14%	12%
Ground shelled corn	54.0	84.3	89.0
Rolled oats	30.0	----	----
Soybean meal, 50%	13.0	12.8	8.0
Dicalcium phosphate	1.6	1.6	1.8
Limestone	0.6	0.5	0.3
Trace mineral salt	0.5	0.5	0.5
Vitamin-antibiotic	0.3[a]	0.3[b]	0.3[b]

[a] Provided 1135 I.U. vitamin A, 340 I.U. vitamin D, 4 mg. riboflavin, 8 mg. calcium pantothenate, 16 mg. niacin, 20 mg. choline chloride, 10 mcg. vitamin B_{12} and 1.13 gm. SP-250 per pound of ration.

[b] Provided 1135 I.U. vitamin A, 340 I.U. vitamin D, 2 mg. riboflavin, 4 mg. calcium pantothenate, 9 mg. niacin, 10 mg. choline chloride, 7 mcg. vitamin B_{12} and 5 mg. chlortetracycline per pound of ration.

Table 2. Supplemental Lysine in Feed or Water for Early Weaned Pigs

	Control	Lysine in Feed	Lysine in Water
	Period I		
Days on experiment	28	28	28
Av. daily gain, lb.	0.69	0.87	0.92
Av. feed per lb. gain, lb.	2.68	2.40	2.25
	Period II		
Days on experiment	36.6	22	21
Av. daily gain, lb.	0.90	1.43*	1.44*
Av. feed per lb. gain, lb.	2.77	2.24**	2.23**
	Period III		
Days on experiment	13.4	28	29
Av. daily gain, lb.	0.91	1.38**	1.51**
Av. feed per lb. gain, lb.	4.00	3.10*	3.01*
	Total Periods I, II, and III		
Av. initial wt., lb.	20.0	19.7	20.4
Av. final wt., lb.	84.7	112.7	118.6
Av. daily gain, lb.	0.83	1.21*	1.28*
Av. daily feed, lb.	2.46	3.12	3.30
Av. feed per lb. gain, lb.	2.96	2.63*	2.58*
Days on experiment	78	78	78

* Significantly different from control ($P < .05$).
** Significantly different from control ($P < .01$).